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BIODIVERSITY

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Human Activities Threaten Nitrogen Cycle

According to a report published this spring, human activities over the past century have led to substantial alterations of the earth's nitrogen cycle, with resulting significant environmental impacts. "Human Alteration of the Global Nitrogen Cycle: Causes and Consequences" outlines the extent of human-induced changes to the natural nitrogen cycle and offers management options to reduce and mitigate those effects. Understanding human-induced changes to the nitrogen cycle and supporting efforts to deal with these changes are likely to be an emerging issue for environmental grantmakers in the very near future.

Natural Nitrogen Cycle

Before looking at human-induced changes, it is important to understand the basics of the natural nitrogen cycle. Nitrogen is essential for plant growth, but plants cannot use the substantial supply of atmospheric nitrogen. Atmospheric nitrogen must be "fixed" — that is, combined with other elements to form compounds — and deposited in the soil before it can be used by plants. A small number of algae and bacteria, many of which live on the roots of legumes, like peas, beans and alfalfa, are able to fix atmospheric nitrogen. Lightning can also indirectly transform atmospheric nitrogen into nitrates, which are deposited on soil. Even after nitrogen has been fixed it may not be immediately available for plants to use, because much of it is locked up in unusable forms in soil organic matter
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Human Changes

Since World War II, human industrial activities have greatly increased the supply of biologically available nitrogen. The largest human-induced addition to the nitrogen cycle has been through the production of fertilizers. In addition, nitrogen fixation has been increased by the cultivation of alfalfa, peas, soybeans and other crops which support nitrogen-fixing algae and bacteria.

Substantial nitrogen is stored in fossil fuels such as coal and oil, in forms not useable by plants. This geological reservoir of nitrogen is released for use by plants when fossil fuels

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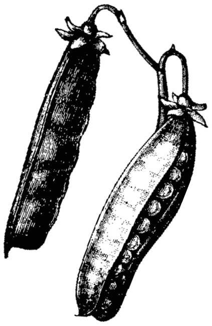


are burned. Nitrogen is also stored in long-term biological pools, such as soil organic matter and tree trunks, where it also is unavailable to plants. Burning forests, wood fuels and grasslands releases nitrogen for biological uses. Draining of wetlands enhances oxidation of soil organic matter and increases the supply of biologically available nitrogen.

Biodiversity & Species Mix

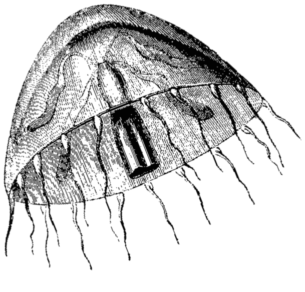
Because many natural biological systems evolved under nitrogen constraints, human-induced increases in nitrogen can shift the dominant plant species and reduce species diversity. Plant species which are able to use fully the increased nitrogen are at a competitive advantage compared to other species. Unique biological communities, especially those adapted to nitrogen deficient soils, can be lost when excess nitrogen is introduced by humans. Biological communities which have had their diversity decreased may be less stable in the face of other major environmental change, including drought.

Atmospheric Impacts

In addition to altering biodiversity, human additions to the natural nitrogen cycle can have large impacts on the atmospheric chemistry, especially through increasing emissions of nitrous oxide and nitric oxide. Increased levels of nitrous oxide act as a greenhouse gas and also assist in breaking down stratospheric ozone, which protects biological systems from harmful effects of ultraviolet light. While nitrous oxide primarily affects the atmosphere at high altitudes, increased nitric oxide reacts with sunlight and oxygen to form smog at low altitudes. Nitric oxide can also be changed into nitric acid, a component of acid rain.

Aquatic Impacts

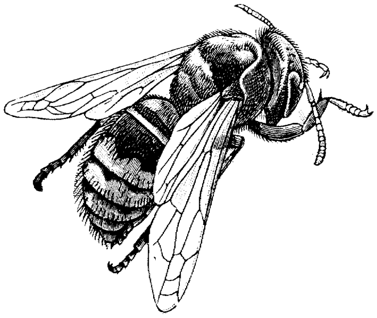
Human-induced changes to the nitrogen cycle also affect aquatic ecosystems. In a recent study, total dissolved nitrogen movement through temperate zone rivers in the North Atlantic Ocean Basin was found to have increased by as much as 20 times over pre-industrial levels. The increases are highly correlated with fertilizer use and atmospheric deposition in these watersheds. Not only has the total amount of nitrogen in the water increased, but so has the proportion of nitrogen made up of nitrates. Increased nitrate concentrations raise significant human health concerns, especially for infants.



Nitric acid from human sources is an increasing cause of lake and stream acidification, as most efforts to control acid deposition have concentrated on cutting emissions of sulfur dioxide rather than of nitrogen compounds. In freshwater ecosystems with rich phosphorus supplies, increased inorganic nitrogen can eutrophy as well as acidify the waters. Eutrophication is a deficiency of oxygen in the water which can lead to death for many aquatic species. Because nitrogen controls productivity in many ocean environments, human additions of nitrogen often lead to marine eutrophication, which is linked to losses in biodiversity in sea-floor communities and among planktonic organisms.

Nitrogen Saturation

"Nitrogen saturation" occurs when plants can no longer utilize further additions of nitrogen because they have exhausted supplies of other resources, such as calcium, phosphorus or water. In this condition, additional nitrogen is lost to surface and ground water, as well as to the atmosphere. Nitrogen saturation can lead to a complex series of events, ultimately decreasing soil fertility through the loss of other nutrients essential for plant growth.



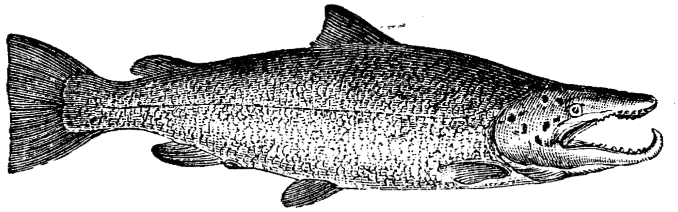
Policy Options

Because fertilizer production is the largest human-induced increase of nitrogen, reducing fertilizer use and mobility is important to minimizing impacts. As much as half of applied fertilizer is lost to water or the atmosphere, representing an economic waste as well as an environmental hazard. Implementing management practices to reduce fertilizer use while maintaining crop yields is particularly important in developing regions. Such practices help reduce the cost of food production and minimize environmental damage. Wetlands serve as natural nitrogen traps, so restoration and maintenance of wetlands is an effective method to keep excess nitrogen out of streams.

Fossil fuel burning is the second major source of human changes to the natural nitrogen cycle. Improving fuel consumption efficiencies and intercepting airborne combustion by-products are critical steps in reducing emissions. As with improvements in fertilizer efficiency, it is especially important to transfer improved combustion technologies to the expanding economies of developing countries.

Human alteration of the earth's nitrogen cycle is just beginning to be understood, but the environmental impact appears to be substantial. Additions of nitrogen are accelerating the loss of biodiversity, especially among plants adapted to low-nitrogen soils. In addition, atmospheric and aquatic systems are being heavily impacted. Environmental grantmakers increasingly will be called upon to support work to better understand human-induced changes to the nitrogen cycle and to investigate and implement economic and policy changes to reduce and mitigate the impacts.

William Hull



CGBD RELEASES REPORT ON SALMON FARMING

Salmon farming is big business. Recent years have seen expansion of the industry worldwide, from Ireland, Norway and Scotland to Canada, Chile, the Faeroe Islands, Tasmania and the U.S. Farmed salmon have flooded markets, driving down prices and leading to increased consumption in three principal markets: Japan, the U.S., and the European Union.

However, according to a soon-to-be-released report by Michael Weber for the CGBD, this increased supply of salmon has come at substantial cost. Salmon farming often has been associated with water pollution, the spread of disease among farmed and wild salmon, entanglement of birds and marine mammals in nets, algal blooms, boom-and-bust economies, and other impacts. As the costs of salmon farming have become apparent, it has come under criticism not only from environmentalists but from fishers, Native Peoples, coastal inhabitants, and tourist businesses.

Although governments and industry now are addressing some of the problems with salmon aquaculture, the CGBD report calls for dramatic steps to promote the maturation of salmon farming into an ecologically sustainable and economically viable activity. The report's recommendations include:

> Halt the expansion of salmon aquaculture
> Change the focus of research and development from production to integration
> Stop the transfer of salmon stocks out of their native watersheds
> Require salmon farms to minimize water pollution and the disruption of marine life
> Make salmon farming compatible with salmon fishing, ensuring the coordination of salmon farming and salmon fishing policies and programs.

[*For a copy of "Farming Salmon: A Briefing Book", contact the CGBD office*.]

CGBD WORKING GROUPS

SYSTEMIC CONTAMINANTS

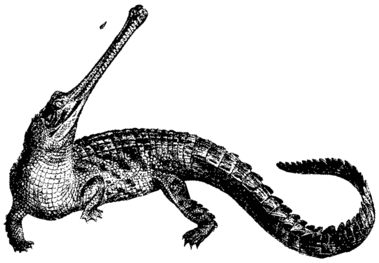
The CGBD is distributing to members The Kliejunas Report, a report commissioned by Systemic Contaminant Working Group members to assess funder activity and opportunities in Environmental Health grantmaking. Through extensive interviews with environmental and health grantmakers, Joanne Kliejunas identifies important distinctions between approaches of these two sets of funders. In general, environmental grantmakers seek to eliminate environmental causes of disease. Health grantmakers more often focus on efficient and just provision of healthcare in treating disease. The opportunities for discussion and shared learning are obvious. The overlap for strategic grantmaking unfortunately is not, or at least is premature.

The report's assessment of our own Working Group members' grants, however, does identify a number of shared grantmaking areas which invite further collaboration among this growing group of mostly environmental funders. The Systemic Contaminants Working Group will convene by conference call and on its list serve to discuss the best application of the report's findings.

In related news, this working group plans to meet early in the New Year, quite possibly in San Diego in February during the Grantmakers in Health meeting there — so we can invite further discussion with those colleagues.

CONSERVATION & DEVELOPMENT

The Conservation & Development Working Group held the third in its series of site-based sessions in Willapa Bay, Washington on October 7 and 8. This meeting focused its discussion on the financial mechanisms that can drive environmentally friendly economic growth. In the Willapa Bay community, a group called Ecotrust has brought in Shorebank, of Chicago, to actually open a community bank and loan fund to support business shifts toward sustainable environmental practices. Meeting participants toured local projects, from a cleaned up mill site for downtown redevelopment to a salmon hatchery that also educates local students on watershed restoration. They then spent a day in intense discussion that asked the tough questions of grantmakers and practitioners alike: What are we learning in these community-based experiments? How can we proceed in other communities? A candid discussion showed we have come a very long way — and that we have only begun to understand processes set in motion that may take decades to prove themselves. All participants recognized the value of checking in and challenging our assumptions on a regular basis.



The working group plans a session in an urban area, early in 1998, to see what progress some city-based projects are making, and what the links are to rural communities and natural ecosystems. Both urban and ecosystem-based grantmakers will be invited to participate.

FORESTS

The Community-Based Strategies subgroup convened a meeting on October 8-10 in Troutdale, Oregon to investigate forest stewardship and sustainable economic development. After learning of the work of the Applegate Partnership and the Quincy Library Group on public lands, attendees heard presentations about similar efforts on private lands in northeastern Oregon and New England. Participants discussed the key themes emerging to guide grantmaking strategies and ways to cooperate to support community-based initiatives, from a coordinated computer link (list serve) among funders, to a multi-site demonstration project to evaluate community strategies.

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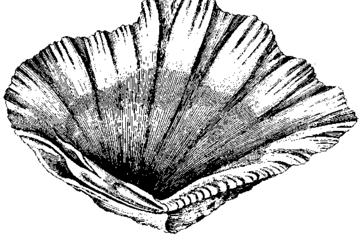

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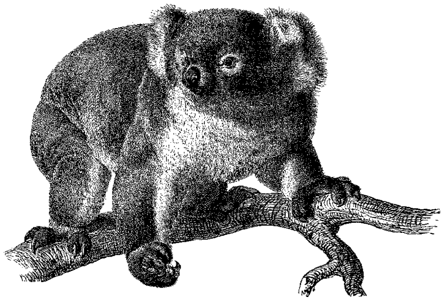
The Wood Use Reduction sub-group, in concert with the Sustainable Forestry/Certification sub-group, is planning a funders' briefing on wood use reduction issues. The briefing is tentatively scheduled for mid-November or early December.

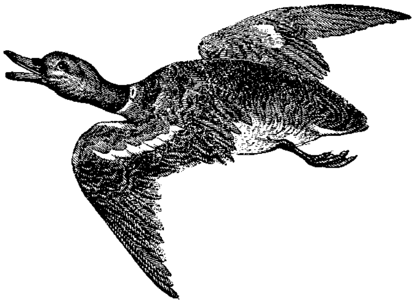
Public policy in the management of public and private forest lands is the likely topic for a meeting of the entire Forest Working Group in early 1998. A steering committee is putting together a program which will look at regional and national policy issues and may address questions of building the capacity of NGOs to advocate for policy change.

MARINES

The Marine Working Group has published "Farming Salmon: A Briefing Book", an overview of salmon aquaculture worldwide. (See article on page 4). The report looks at the growth in salmon farming, discusses environmental and social problems associated with the industry, and outlines steps to make salmon aquaculture environmentally and economically sustainable.

Working group members continue to cooperate on regional fishery advocacy efforts, in particular focusing on implementation of the federal Magnuson-Stevens Fishery Conservation and Management Act. During conference calls in August and September, members shared information on multi-NGO proposals to assure an environmental voice at regional fishery management council meetings.





BIODIVERSITY PROJECT

Survey Says....

The Biodiversity Project's mailbox is quickly filling up with responses to the two surveys mailed out in September -- one to environmental grantmakers and one to leading local and national NGO leaders. These surveys will be used to assess current levels of funding and organizational activity in the areas of biodiversity education and outreach. The findings will contribute to a Strategic Opportunities Analysis, a comprehensive document intended to assist grantmakers and NGO leaders in identifying gaps and opportunities for future biodiversity outreach and education efforts.

Focus Groups

In October, Belden & Russonello conducted a series of focus groups for The Biodiversity Project to test American's attitudes about housing preferences, land use and sprawled development. The goal of the research is to inform a public communications strategy for building support for policies and behaviors that stop sprawl and protect biological diversity. Focus groups were conducted in Charles Co. MD, Atlanta, GA, Palm Beach Co., FL, Boise, ID, Traverse City and Grand Rapids, MI. The findings of the research will be presented at a briefing in Washington, DC, and will also be available in report form.

CGBD MEMBER NEWS

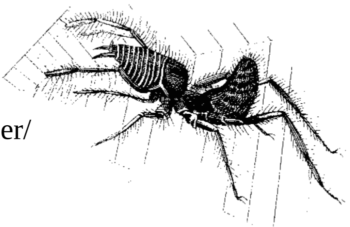
On August 1, Amy Shannon left the John D. and Catherine T. MacArthur Foundation, moving to Manhattan, Kansas. Amy will continue her relationship with the Foundation as a consultant, specifically working with the Latin American grantees and the Sustainable Development Policy and Environmental Law portfolios.

After 20 years with the Ford Foundation, Fran Korten is leaving to become Executive Director of the Positive Futures Network, a small non-profit based in the Pacific Northwest. According to Fran, one of the main activities of the Network is to produce a magazine that provides a reliable place to find news of people and organizations working to build more just, sustainable, societies.

FOUNDATIONS ON THE WEB

Since the CGBD wouldn't exist without its member foundations, this autumnal web search is dedicated to listing member web page addresses. The Foundation Center Online page < http://fdncenter.org/ > was most helpful in locating foundation websites.

Jenifer Altman Foundation	http//:www.jaf.org
Brainerd Foundation	http//:www.brainerd.org
Bullitt Foundation	http//:www.bullitt.org/
Conservation, Food & Health	http//:fdncenter.org/grantmaker/cf&hf/index.html
Nathan Cummings Foundation	http//:www.ncf.org
Ford Foundation	http//:www.fordfound.org
George Gund Foundation	http//:www.gundfdn.org/
Vira I. Heinz Endowment	http://www.heinz.org/
W. Alton Jones Foundation	http//:www.wajones.org/start.html
MacArthur Foundation	http//:www.macfdn.org
Charles Stewart Mott Foundation	http//:www.mott.org/
New England Biolabs Foundation	http//:www.nebf.org/
Packard Foundation	http//:www.packfound.org/packhome.html
Pew Charitable Trusts	http//:www.pewtrusts.com/
Rockefeller Brothers Fund	http//:www.rbf.org/rbf/
Surdna Foundation	http//:www.surdna.org/surdna/
Turner Foundation	http//:www.turnerfoundation.org/turner/
Weeden Foundation	http//:www.weedenfdn.org/



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